WATER RESOURCES RESEARCH GRANT PROPOSAL

Project ID: 2005VT22B

Title: Trophic status of Lake Champlain over 400 years of changing land use: A paleolomnological study

Project Type: Research

Focus Categories: Water Quality, Nutrients, Sediments

Keywords: eutrophication, blue green algae, phosphorus, nitrogen, silica, diatoms, sediments, land use, paleopigments, paleolimnology, stable isotopes

Start Date: 03/01/2005

End Date: 02/28/2006

Federal Funds: $29,720

Non-Federal Matching Funds: $61,624

Congressional District: First

Principal Investigators:
Andrea Lini

Suzanne Levine
University of Vermont

Abstract

Lake Champlain is a treasure and the lifeblood of Vermont. It provides drinking water for many of the State's residents and recreational opportunities that improve quality of life and stimulate tourism. Unfortunately, portions of the lake have undergone eutrophication. Water clarity has declined, weed beds abound in shallow areas, and toxic algal blooms occur in the Northeast Arm of the lake, especially in Missisquoi and St. Albans Bays. Managers would like to restore the lake to more oligotrophic conditions, but lack some of the basic information needed to achieve restoration at minimal cost and with maximum efficiency. Their efforts would be more informed with data on the pre-settlement trophic status of the lake's various sub-basins and large bays, and knowledge of when the current eutrophication episode began. The lake has a rich, three-century history of changing land use, industry and commerce, including periods when agriculture, deforestation and point source pollution were more intense than today. Researchers might take advantage of this history to learn more about the details of eutrophication (and perhaps recovery) unique to

this lake, and to seek relationships between different land use practices and trophic condition. Although comprehensive monitoring of Lake Champlain was not initiated until very recently (1992), long-term data can be obtained through paleolimnological examination of sediment cores. Our intent is to obtain cores from four sites in Lake Champlain, two eutrophic and two oligo-mesotrophic. The cores will be dated and analyzed for several proxies of trophic state, including rate of sediment accumulation, nitrogen, phosphorus and organic content, stable isotope composition, paleopigment composition and microfossils. A timeline will be developed and canonical ordination methods used to assess the relative impacts of different land uses and urban activities on observed changes in trophic state.